**IT Applications Unit 3  
Chp 3: Networked Information Systems**

**Connect, communication standards, protocols & transmission media**

**Network communication standards or protocols**

1. Why are network standards established?  
   They have been established to overcome the problems of incompatibility on a network and to ensure that hardware and software components can be integrated into any network.
2. What is a network standard?  
   A network standard is a set of guidelines that manufactures must follow in the design and production of their hardware and software products.  
   They specify how computers access the network to which they are attached, the type of medium used, the speed of data transfer across the network and the types of cable or wireless connection that are supported.

**Ethernet**

1. What is the Ethernet standard?  
   The Ethernet standard describes communication over a single cable shared by all devices on the network.
2. What is the advantage of this standard?  
   A device connected to the cable is able to communicate with any other attached device.
3. Using the Ethernet standard, what is a limiting factor in a network?

If two or more computers transmit data, then a collision has occurred. When a node detects a collision further transmission is stopped and waits a random amount of time. The random amount of time ensures that a collision does not occur again.

1. What type of Ethernet is the schools network, cable type, maximum length, topology and transfer rate?

**Token Ring**

1. Describe the nature of this standard

Token ring network has a special signal called a token, that travels continuously around the ring network, it includes a message that identifies whether the token is busy or available to carry a packet of data. There is only one token for each network, it travels in a single direction around the ring. When a message is transmitted it requires the token, if it is busy, the device must wait until the next time the token comes around.

**TCP/IP**

1. Describe the nature of this protocol.

Transmission Control Protocol/Internet Protocol is the protocol that the internet is based, it defines how data is carried from one part of the network to the other.

1. What is the advantage of this protocol in the internet?

**802.11 wireless standard**

1. What is a Wi-Fi network?

This enables two computers or devices to communicate using radio waves, devices that are up to 50 metres apart can be connected.

1. List the different wireless standards and their transfer rate.  
   -802.11a – up to 54 Mbps  
   -802.11b – up to 11 Mbps  
   -802.11g – 54 Mbps and higher  
   -802.11n – 108 Mbps to possibly 540 Mbps

**Network transmission media**

**Physical transmission**

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| --- | --- | --- | --- |
| **Media** | **Characteristics** | **Advantages** | **Disadvantages** |
| Twisted-pair cable | \*8 wires twisted in separate pairs  \*2 wires signal to the hub and 2 wires carry signals from the hub  \*CAT 3 can carry 10Mbps over 100 metres  \*CAT 5 can carry 100Mbps over 85 metres  \*Most star networks use it. | \*Relatively inexpensive  \*Efficient, 2 wires carry to the switch, 2 wires carry from it. |  |
| Coaxial cable | \*Contains 2 wires, the inner wire surrounded by insulation, then a copper braid or aluminium, tine and finally another layer of protection.  \*Carry data at 10 Mbps over 185 metres  \*Used in bus networks  \*Is typically used in situations where there is no hubs or switched. |  | \*Less common today  \*A single broken wire disrupts the entire network.  \*Devices can have to wait a long time for a gap in network traffic before information can be transmitted over the network. |
| Fibre-optic cable | \*Consists of special glass or plastic strands that can transmit light impulses.  \*Speed relies entirely on the quality of the light generated and the light receiver on the ends of the strands. | \*It can carry information reliably over up to 2km.  \*Same strand can simultaneously carry pulses of light at different frequencies.  \*Multiple users can use a single strand at exactly the same time | \*Very expensive |

**Wireless Transmission**

|  |  |  |  |
| --- | --- | --- | --- |
| Radio waves |  | \*Can be transmitted over long distances as well as small  \*Offers great flexibility with cable |  |
| Radio waves – Wi-Fi |  | \*Can be used anywhere in range of the WAP  \*Allows users to connect without cables |  |
| Radio waves – Bluetooth |  | \*Useful with handheld computers, PDAs and smart phones. | \*Only up to 10m range  \*Slow transfer rate |
| Microwaves | Use line of sight transmission between sending and receiving dishes.  Stations are usually located on top of mountains or large buildings. | \*Very high data rates over short distances  \*More bandwidth than radio | Line if sight |
| Satellite | \*Can be in the form of radio waves or microwaves.  \*Wireless receiver/transmitter launched by a rocket to orbit the earth. | \*Can be an internet alternative for people living in rural and remote areas. | \*Long distance to travel to the satellite back to earth |
| Infra-red |  | \*Data transfer rate is slow.  \*used for printers and laptops. | \*Uses only short distance, up to 5 metres.  \*requires line of sight |